

March
2009

West Hartford Comprehensive Energy Plan



March 6, 2009
West Hartford Clean Energy Task Force

Contributing authors:

Tim Brennan, Town Councilor
Robert Palmer, Director of Facilities
Robert Bell
Joseph Campanella
Tom Coughlin
Rachel Hurvitz
Dylan Kletter
Paul Popinchalk
Roger Smith



West Hartford Comprehensive Energy Plan

Contents

Resolution Regarding a Comprehensive Energy Plan for the Town of West Hartford..... i

EXECUTIVE SUMMARY i

Vision Statement vi

Scope of Plan..... viii

I. Energy: Buildings, Lighting, Clean Energy Generation 1

II. Energy Planning, Implementation and Financing.....7

III. Energy: Vehicles, Transportation, Outdoor Engines..... 11

IV. Energy-Efficient Product Purchasing and Procurement16

V. Conclusion18

Appendix 1. Municipal Energy Manager19

Appendix 2: Green Buildings..... 24



Resolution Regarding a Comprehensive Energy Plan for the Town of West Hartford

WHEREAS the Town of West Hartford is committed to achieving a more sustainable future by efficient operation of its facilities, lighting systems and vehicle fleet through implementation of energy conservation strategies and the use of renewable energy sources; and

WHEREAS the Town of West Hartford has committed to the “20% by 2010” campaign such that by the year 2010, the town’s municipal facilities will purchase 20% of its energy needs from clean energy sources; and

WHEREAS Mayor Slifka has signed the US Conference of Mayors Climate Protection Agreement, committing the Town of West Hartford to reduce its greenhouse gas emissions by 7% below 1990 levels; and

WHEREAS Mayor Slifka has signed the EPA Community Energy Challenge, committing the Town of West Hartford to reduce its energy consumption by 10%; and

WHEREAS improved energy efficiency promotes and improves the fiscal health and well-being of the Town of West Hartford.

NOW THEREFORE BE IT RESOLVED BY THE TOWN COUNCIL OF WEST HARTFORD THAT the Town Manager and the Clean Energy Task Force are hereby requested, together with key stakeholders in the community, to develop a comprehensive energy plan for the Town’s buildings, lighting and vehicle fleet.

The energy plan shall identify opportunities for (i) energy mitigation through improved efficiencies and a culture of conservation and (ii) the increased use of clean and renewable energy sources. The scope of the plan shall include, but not be limited to, an evaluation of mechanical and personal uses of energy, policies and practices to achieve reductions in energy use, an analysis of state and federal financial incentives. The plan shall prioritize actions that reduce: energy costs over the lifetime of the investment, volatility in energy costs, greenhouse gas emissions, indoor and outdoor air pollution and dependency on fossil fuels. The final plan shall be submitted to the Town Council by March 1, 2009.

EXECUTIVE SUMMARY

The West Hartford Town Council requested the West Hartford Clean Energy Task Force to “develop a comprehensive energy plan by March 1, 2009 for the town’s buildings, lighting and vehicle fleet” and to “identify opportunities for (i) energy mitigation through improved efficiencies and a culture of conservation and (ii) the increased use of clean and renewable energy sources.” This plan aims to steer the municipality toward clean energy and energy efficiency through both changes in technologies and through individual action and education. It does not address opportunities to further clean energy among town residents and businesses. We believe that implementation of the plan will further West Hartford’s efforts in addressing global climate change and at the same time will result in both short and long term savings for the Town.

I. Energy: Buildings, Lighting, Clean Energy Generation

This section recommends the establishment of a comprehensive 10 year process to implement all energy efficiency measures that are cost-effective across the town's buildings, build all new buildings and major building renovations to green standards, upgrade non-building lighting over time and increase the use of clean, renewable energy sources. It also prioritizes furthering a "culture of conservation" among all who use our energy in schools and other town buildings so that energy conservation becomes part of our consciousness.

A. Energy assessment- create a baseline of energy usage

***Policy Statement:** Collect building energy use to create a baseline to enable the development of a comprehensive building upgrade strategy and compare the efficiency of our buildings to each other and others in the state and region. Without a baseline it is impossible to measure progress.*

Key Action: Complete energy benchmarking of all West Hartford buildings by November 1, 2009.

B. Establish Energy Efficiency and Clean Energy Master Plan and Policies for Buildings

***Policy Statement:** Create town building master energy plan to increase building energy efficiency and increase on-site renewable energy generation over the next 10 years. Institute policies requiring new buildings and major building renovations to meet green standards.*

Key Actions:

- Require all new building construction (or renovations in excess of \$2 million) to meet LEED Gold green building standards and the latest International Building Code’s energy efficiency standard.
- Create a comprehensive town-wide building efficiency strategy with prioritization of upgrades, timelines and an assessment of funding options by December 31, 2009.
- Create a short-term renewable energy strategy prioritizing town buildings for solar

photovoltaic and solar water heating installations by June 1, 2009.

C. Non-Building Clean Energy Generation

Policy Statement: Explore potential for clean distributed generation systems.

Key Actions:

- Prioritize central Combined Heat and Power systems when undertaking major renovations or new construction.
- Explore the potential of other clean energy technologies such as micro-hydro turbines, wind turbines, geothermal heat pumps and fuel cells to reduce greenhouse gases, electricity costs and price volatility over time.

D. Non-Building Lighting (street lights and traffic signals)

Policy Statement: Increase the energy efficiency of town lighting.

- **Assess whether certain street lights can be removed, or powered down** during certain hours, without compromising safety.
- **Phase out conventional street lamps over time:** continue to replace traditional lighting fixtures with alternatives that do not contain or contain less heavy metals and are more energy efficient, such as LEDs (light emitting diodes).

E. Culture of Conservation

Policy Statement: Develop culture of conservation by educating end-users on strategies to reduce energy consumption.

Key Actions:

- **Create a standing town-wide Energy Management Team for all schools and municipal buildings:** Involve students, teachers, energy managers, town employees, board members, political leaders and other stakeholders in monitoring and coordinating progress towards meeting the goals of this town-wide energy plan and encourage collaboration and information sharing.
- **Encourage the creation of a “clean energy team” in each town-owned building:** Small teams of employees and users of each building will engage in a collaborative process where building users help recommend and implement measures to improve their buildings.
- **Continue the West Hartford Public School energy competition and consider expanding to town buildings**
- **Raise awareness and encourage voluntarism:** Encourage residents to volunteer their time and skill to augment West Hartford staff in matters including energy-related grant applications, entering data into the EnergyStar building portfolio manager tool and more.

II. Energy Planning, Implementation and Financing

A. Planning and Implementation

***Policy Statement:** Reduce town energy expenditures by centralizing and increasing staffing devoted to energy planning and implementation.*

Key Action:

We recommend that West Hartford follow the example of Hartford and Stamford and hire a full-time in-house town energy manager paid for through energy savings: West Hartford does not currently have a dedicated energy manager to plan and oversee implementation of energy efficiency projects, create a comprehensive building upgrade plan, motivate and train building operators and users on buildings efficiency practices, educate town staff whose work impacts energy use, develop procurement standards for products, apply for state and federal grants, update building energy inventory data, assess energy reduction strategies, and re-assess energy efficiency and clean energy options as new technologies arise. This shortage of staffing will result in higher energy costs to the town in the short and long term. The salary for the energy manager position can be made budget neutral by paying for it after the first year through energy savings.

B. Energy Financing

***Policy Statement:** Implement energy efficiency upgrades and maximize the use of clean, renewable energy at the least cost to taxpayers by utilizing creative financing mechanisms.*

Key Actions:

- **Create a hierarchy of funding options:** Maximize the use of “on-bill financing” (at no interest), prioritize efficiency projects within the capital improvement plan, then fund projects from the energy surplus account in the town operating budget. Consider performance contracts with third-parties if other funding options are not feasible.
- We recommend the town **reserve at least 50% of energy savings to reinvest in further energy and environmental improvements**, with the rest of the savings reverting to the town budget.

III. Energy: Vehicles/Transportation/Outdoor Engines

- West Hartford owns approximately 300 vehicles.
- In 2008, the Town used 187,000 gallons of gasoline and diesel fuel, which cost the town about \$670,000.
- In 2008, carbon emissions from Town vehicles = approximately 1,650 metric tons.
- Average fuel costs per gallon of gasoline/diesel is likely to increase from current levels

***Policy Statement:** Increase fleet fuel efficiency, evaluate use of lower polluting fuels, and decrease vehicle use to reduce costs, mitigate fuel price volatility, and reduce carbon emissions.*

Key Actions:

- **Reduce gallons of vehicle fuel use 5% this year** (from 2008 baseline) which would save approximately \$34,000 per year and reduce carbon dioxide emissions approximately 82 metric tons per year.
- **Reduce fuel use 10% by 2011**, resulting in cost savings of approximately \$68,000 per year (at current fuel prices) and reducing carbon dioxide emissions approximately 164 metric tons per year.
- **Set goals to improve fleet fuel efficiency** (miles per gallon per vehicle),
- **Increase the use of lower carbon/lower polluting fuel over time.**
- Further a **culture of conservation** for individuals and departments.

IV. Procurement and Purchasing

A. Energy-Efficient Product Purchasing and Procurement

***Policy Statement:** Purchase products and institute consistent practices across all town departments that conserve energy and water, reduce greenhouse gas emissions and minimize the town's consumption of resources and costs over time and by doing so, be a leader in the state in creating a more energy efficient government and serve as a model to town residents.*

Key Actions:

- (1) **Standardize purchases and procurement:** Create guidelines for departments to encourage standardization in purchases to reduce staff training needed to operate the equipment. Building energy management systems should be prioritized for standardization.
- (2) **Purchase energy saving appliances:** Town departments should contact town facilities staff before purchasing any significant appliance for assistance choosing an efficient model.
- (3) **Give preference to electricity from clean, renewable sources.**
- (4) **Lease or purchase only the most fuel-efficient models available that are suitable for the task:** In addition, the town can reduce the number of vehicles required to be purchased through car-sharing and car-pooling.
- (5) **Give preference to third party contractors who use California Air Resources Board or EPA certified diesel emissions controls on their on and off road equipment.**

V. Conclusion: Recommended Future Actions

- (1) Revise this energy plan annually and make it a living document:** We recommend that the town manager set an update schedule for this plan, including quarterly reporting from each department to assess progress in achieving the objectives of this plan.
- (2) By March 1, 2010 develop a comprehensive clean energy plan for West Hartford residents, businesses and institutions.**
- (3) Consider broader sustainability or greenhouse gas plans.**

Vision Statement

There comes a time in the affairs of society when great forces move communities to action. Now is such a time. Our notion of continuous growth in consumption is being severely challenged. While our community has fared better than many, we are hardly immune from the consequences – financial and environmental – of unchecked energy consumption that ripple through our community, our nation and our world.

In this 21st century, we are awakening to the recognition that the continuous growth of the world's use of natural resources cannot be sustained. Our economic well-being is threatened by the vagaries of world oil prices. Our nation's foreign policy options are narrowed by reliance on resources in unstable, undemocratic or hostile nations. Our continued reliance on fossil fuels is accelerating the decline of our environment, including the reality of climate change which is no longer an exercise in academic debate.

The issue of energy use planning is nationally neither coordinated nor comprehensive. Our West Hartford community relies almost exclusively on energy sources from outside of our community. Each payment for gasoline, oil, electricity and natural gas sends dollars out of our local economy. If we leave the responsibility of a continuous and affordable supply of energy for the coming years to others outside the town, we do so at our peril.

The elected leadership of our town understands the importance of this vital resource to our continued success and quality of life as a community. West Hartford's leadership have committed to using 20% renewable electricity by 2010, endorsed the goals of the US Mayors Climate Protection Agreement to reduce our greenhouse gas emissions, and have formally joined the EPA Community Energy Challenge, which commits the town to a minimum of a 10% reduction in energy usage.

Perhaps the single most important aspect of the energy plan is to further a culture of conservation with all stakeholders in the town. While new technologies are important, how people use buildings, lighting and vehicles are equally critical. Efficient usage of energy always results in tremendous cost savings, as evidenced by the approximate \$30,000 and 187,000 kilowatt-hours in savings borne out of a recent energy competition in our schools. This plan starts with the belief that to be sustainable, everyone must own sustainability. Conservation is not something to be imposed, but a shared sense of purpose and responsibility where town leadership, employees, students, teachers and residents challenge each other to achieve common goals, encourage creativity, and hold one another accountable.

Our research of both the town's efforts and other municipalities reveals that a culture of conservation is best accomplished by:

- ◆ **EDUCATING**, and soliciting ideas from, all stakeholders on the possibilities of conservation. Examples include debunking myths such as the notion that lights shouldn't be turned off once turned on to save money; fully powering down equipment and using and shutting off power strips to reduce phantom loads; removing all unnecessary equipment and appliances such as "dorm" refrigerators and including energy efficiency curricula for schools.

- ◆ **MEASURING** both cost and energy savings from conservation efforts. Savings such as those obtained in the schools' energy competition should be made permanent through ongoing efforts and communicated to all stakeholders to increase awareness and ownership of accomplishments. Communication of such measurements should be expressed both in cost savings and the relevant unit of energy (e.g., kilowatt-hours) so that price volatility does not obscure the result of the efforts.
- ◆ **REWARDING SUCCESS.** The implementation of energy conservation efforts should continue to be non-judgmental. As stakeholders make accomplishments, they should be rewarded and acknowledged. A recent example is the acknowledgment by the Board of Education and the Town Council of the energy competition winners and participants.



With the right energy choices we can achieve these goals while reducing costs, lessening our exposure to price volatility, increasing local installations of clean, renewable energy, and reducing pollution. It is with this knowledge that they have invited our citizens to join them in fashioning a plan informed by purposeful deliberation that maps a way forward to a more sustainable future. It is in this spirit that we offer this energy plan for our community. By design, this is a work in progress, to be shaped and updated continuously in response to changing circumstances. It is our hope that this document will serve as a roadmap for the implementation and delivery of town services over time in a sustainable manner. And further, it is our hope that this will serve to inspire our fellow citizens, businesses and institutions to join in partnership to fashion a sustainable future and serve as a positive example for others.

Scope of Plan

The West Hartford Clean Energy Task Force was established by the West Hartford Town Council to advise the council on energy related matters and promote clean energy to town residents as part of the 20% by 2010 clean energy campaign. The West Hartford Clean Energy Task Force (WH CETF) is a volunteer body with representation from town council and town facilities staff. The WH CETF met weekly with stakeholders and interested residents from January to March 2009 to produce this plan by the March 1, 2009 deadline set by the Town Council.

The Town Council requested the WH CETF to "develop a comprehensive energy plan for the Town's buildings, lighting and vehicle fleet" and to "identify opportunities for (i) energy mitigation through improved efficiencies and a culture of conservation and (ii) the increased use of clean and renewable energy sources." This plan aims to steer the municipality toward clean energy and energy efficiency through both changes in technologies and through individual action and education.

This plan targets town operations and infrastructure. This plan does not address clean energy and energy efficiency opportunities for residents and businesses, but recommends the council continue this energy planning process and broaden the scope to all members of the West Hartford community in a future iteration.



I. Energy: Buildings, Lighting, Clean Energy Generation

This section recommends the establishment of a comprehensive 10 year process to implement all energy efficiency measures that are cost-effective across the town's buildings, hold all new buildings and major building renovations to green standards, upgrade non-building lighting over time and increase the use of clean, renewable energy sources. It also prioritizes furthering a "culture of conservation" within students, town employees and town building users to use the buildings in an energy conscious manner.

Policy Statement: *Collect building energy use to create a baseline to enable the development of a comprehensive building upgrade strategy and compare the efficiency of our buildings to each other and others in the state and region. Without a baseline it is impossible to measure progress.*

A. Energy Assessment: Create a Baseline of Energy Usage

Current status and progress to date:

West Hartford has joined the EPA Community Energy Challenge, which commits the town to a minimum of a 10% reduction in energy use from an established baseline and which requires us to enter this data into the Energy Star building benchmarking tool. To establish this baseline of how much energy we use, in 2008 West Hartford contracted with a third-party, EnergySolve, which creates and maintains a centralized database tracking the use and costs of electricity, fuel oil, and natural gas in both town and Board of Education buildings.

Actions:

- (1) Enter building data for all West Hartford buildings into the Energy Star benchmarking tool by November 1, 2009.** The EnergyStar building portfolio manager tool compares the efficiency of town buildings with similar structures throughout the state, region and country and rates buildings based on their efficiency. Utility bill data tracked using EnergySolve can be imported into this database and assistance is available from US EPA, and the Institute for Sustainable Energy at Eastern Connecticut State University.

- (2) Adopt a methodology for calculating life cycle energy costs:** The methodology can aid in prioritizing energy efficient upgrade projects. It can also distinguish between projects which have significant upfront costs but substantial benefit and projects which are simply an expense. Sample methodologies have been promulgated by the National Institute of Standards and Technology.

B. Establish Energy Efficiency and Clean Energy Master Plan and Policies for Buildings

Policy Statement: Create town building master energy plan to increase building energy efficiency and increase on-site renewable energy generation over the next 10 years. Institute policies requiring new buildings and major building renovations to meet green standards.

Current status and progress to date:

- **Energy efficiency:** West Hartford has undertaken a number of efficiency and clean energy upgrades for town buildings on a project by project basis but does not have an overall plan for town facilities and equipment. Projects done to date include: (1) replacing traffic control lighting with efficient LEDs (Light-Emitting Diodes); (2) installing LED lighting fixtures in Blueback Square garages; and (3) upgrading windows and air conditioners as part of our capital improvement plans and (4) upgrading the Town Hall chiller with a highly energy efficient unit.
- **Clean Energy:** West Hartford currently is in the process of procuring four large (100 kilowatt each) solar photovoltaic arrays for two schools and two town buildings. In addition, as of February 2009, the town has earned 13 kilowatts of free solar photovoltaic panels from the CT Clean Energy Fund as a result of purchasing renewable energy and for having residents participate in the clean energy option program on their electric bills. The town recently conducted energy audits on four buildings to qualify for CT Clean Energy Fund rebates for solar photovoltaic panels.
- **Green building:** A 2007 state law requires the town to adopt LEED Silver certification and 20% more energy efficiency than the current state building code for all buildings built or renovated with state funding. No buildings have yet been built by West Hartford to this standard.



Actions:

- (1) Require all new building construction (or renovations in excess of \$2 million) meet LEED Gold green building standards and the latest International Building Code energy efficiency standard:** The town should commission buildings to ensure that all efficiency systems work properly and achieve the promised efficiencies and savings. LEED Silver is the minimum required by state law, and West Hartford as a community can and should go beyond the legal minimum to achieve significantly more environmentally sound buildings with significantly lower energy use.

- (2) **Expand building energy audits to all town buildings- conduct basic energy audits for all 31 public buildings by October 31st, 2009:** The audits should include an assessment for heating, cooling and electricity, and must assess the payback period for building upgrades. The purpose of creating an inventory is to enable prioritization of building upgrades and enable the town to identify the cost-effectiveness of different approaches. The town should consider free auditing provided by the CT Energy Efficiency Fund and utilize funding from the energy surplus account.
- (3) **Create building-by-building upgrade plans by November 15, 2009** based on the results of the energy audits in (2). Between now and 2020 the town should implement all energy efficiency measures that are cost-effective and save the town money over the lifetime of the investment. The scope of efficiency measures should include heating, cooling, electricity and water. In addition to prioritizing measures which maximize savings to the town, building upgrades should be prioritized that offer important co-benefits such as improving indoor air quality, protecting the health of building occupants, and improving productivity.
- (4) **Compile building upgrade plans from (3) into a comprehensive town-wide building efficiency strategy with prioritization of upgrades, timelines and an assessment of funding options by December 31, 2009:** The town manager and plant facilities staff should take the lead creating this strategy, and could coordinate with the West Hartford Clean Energy Task Force for assistance.
- (5) **Retain third parties to conduct more detailed and rigorous building energy audits as buildings are upgraded beginning in 2010:** Based on the Energy Star building benchmarking and the prioritized building upgrade plan, the town should hire third parties to conduct more rigorous assessments of buildings that are least efficient in preparation of making near-term upgrades. Detailed engineering assessments should be performed as needed to determine exactly which technologies to apply, and exact costs and savings at a level of detail beyond that provided in the more basic initial assessments.
- (6) **Create a short-term renewable energy strategy prioritizing town buildings for solar photovoltaic and solar water heating installations by June 1, 2009:** The West Hartford Clean Energy Task Force and town facilities managers should prepare this strategy in preparation for pending state and federal incentive programs. Solar energy is the most abundant renewable energy resource available to the town, can predictability to utility bills and save money over time, and significant support for solar is expected at the state and federal level.
- (7) **Longer-term renewable energy strategy:** West Hartford should assess the ability of other technologies, including micro-wind turbines, geothermal heat pumps and fuel cells to meet building energy needs while reducing greenhouse gas emissions, energy costs and energy price volatility and increasing reliability.
- (8) **Examine potential for vegetative "green" roofs:** These roofs can reduce run-off and reduce building cooling loads. Locations for this installation should focus on buildings where solar installations are not possible as they compete for roof space.

(9) Decline to participate in programs to run distributed diesel generators at non-emergency times: Such programs significantly increase ozone forming nitrogen oxide and health-harming particulate matter emissions and present a threat to the health and welfare of West Hartford residents. Diesel generators, with or without pollution controls, have significantly worse emissions profiles than standard centralized power plants according to the CT Department of Environmental Protection. West Hartford can instead opt to participate in peak load-shedding programs which reduce stress on the electric grid and reduce pollution.

(10) We recommend that the town hire a dedicated in-house Energy Manager to oversee this process and implement the recommendations: For West Hartford to achieve these standards, the town should consider hiring a dedicated energy manager to monitor progress and facilitate goals. Please see *II. Energy Planning, Implementation and Financing* for a more detailed discussion of this recommendation.

C. Non-Building Clean Energy Generation

Policy Statement: Explore potential for non-building clean distributed generation systems and/or renewable energy generation.

Current status and progress to date:

West Hartford currently does not have any centralized generation systems to provide heating, cooling and electricity for town buildings. Local generation can be significantly more energy efficient and cost-effective than utilizing building air conditioners, furnaces and purchasing electricity from the grid.

Actions:

- (1) Prioritize central Combined Heat and Power systems when undertaking major renovations or new construction:** Cogeneration systems operate by utilizing a fuel like natural gas to produce electricity while using the excess waste heat to make steam and hot water. By harnessing the excess heat, cogeneration systems operate at approximately 80 percent efficiency as opposed to 30 percent efficiency typical in conventional power plants. We recommend the town should assess the potential for district heating and cooling to cut town energy costs if major renovations or expansions are undertaken for town buildings.
- (2) Explore the installation of free-standing solar photovoltaic installations on underutilized property:** If the state changes its rules governing solar installations, the town should assess potential sites and economics of free-standing solar at locations including parking lots, brownfields, and other underutilized spaces. The town could advocate, through its local and state elected officials, for changes in state laws to promote this type of sustainable power generation.
- (3) Explore the potential of other clean energy technologies:** For example, micro-hydro turbines, micro-wind turbines and fuel cells can reduce greenhouse gases, electricity costs and price volatility over time.

(3) Create department energy guidelines to eliminate wasteful energy consumption: The guidelines should address wasteful energy activities including, but not limited to, the use of personal electric space heaters, inefficient coffee pots, and leaving lights (interior and exterior) and computers left on when not in use.

(4) Create and disseminate energy survey for building users: The survey should ask building users, including students, to suggest ways to increase building efficiency and comfort. Consider offering rewards or recognition for the best entries. In conjunction, the town should consider installing suggestion boxes (or a virtual equivalent) in municipal buildings to encourage resident participation on cost saving strategies.

(5) Encourage the phase out of inefficient dorm-sized refrigerators in all public buildings by September 1, 2010: Encourage and reward consolidation into more centralized energy efficient refrigerators and offer ice packs and coolers as an alternative for an in-room cooling option.

(6) Continue the West Hartford Public School energy competition: Due to the success of this competition, we recommend continuing the competition on a recurring basis. Consider expanding to non-school town buildings.

(7) Raise awareness and encourage voluntarism: Encourage residents to volunteer to use their time and skill to augment West Hartford staff in matters including energy-related grant applications, entering data into the EnergyStar building portfolio manger tool and more.

(8) Consider installing other visual means of demonstrating building energy use to building users. Smart meters or other monitors can allow users to see actual results of building use, encourage efficient behavior, and enable them to track their progress.



II. Energy Planning, Implementation and Financing

This section deals with the staff resource needs for the establishment and implementation of a comprehensive 10 year process to implement energy efficiency and clean energy measures described in *I: Energy: Buildings, Lighting, Clean Energy Generation*. It also establishes a mechanism for prioritizing how these measures will be funded and what happens with energy savings from the implementation of this plan.

A. Planning and Implementation

Policy Statement: *Reduce town energy expenditures by centralizing and increasing staffing devoted to energy planning and implementation.*

Current status and progress to date:

Since 2007 West Hartford has one staff member in charge of building energy use, facilities and maintenance staff, as well as energy procurement and planning. West Hartford also has contracted with EnergySolve, an energy information services company, to centralize municipal energy billing in an online database. In addition, as needs have arisen, West Hartford has contracted with energy brokers and consultants to assist with energy planning and assessment.



The current energy planning and assessment arrangements have resulted in a number of notable successes that have reduced the town operating budget, including (1) securing competitively priced contracts for electric and natural gas service; (2) increasing building efficiency, such as retrofitting lighting in the Blue Back parking garages; and replacing the chiller in Town Hall with a highly efficient model.

Furthermore, recent audits of four town buildings estimate that implementation of cost-effective efficiency measures cumulatively would save the town significant amounts of money for electricity and natural gas, including a number of measures with a two-year payback.

Actions:

- (1) We recommend that West Hartford hire an in-house town energy manager: A town energy manager would oversee energy audits for all town buildings including schools, oversee implementation of energy efficiency projects, create a comprehensive building upgrade plan, train building operators and users on buildings efficiency practices, educate town staff whose work impacts energy use, develop procurement standards for products, apply for state and federal grants, update building energy inventory data, assess energy reduction strategies, and re-assess energy efficiency

and clean energy options as new technologies arise. See Appendix 1 for examples of successful municipal energy managers.

We recommend that the energy manager be an in-house position to fully represent the interests of the town and avoid conflicts of interest with for-profit employers. In addition, a full time, in-house energy manager can maximize energy savings rather than the more limited savings achievable if town energy management is only one of many responsibilities of a given staff member. In this scenario, the town would continue to need staff to manage relationships with outside contractors and companies. Most importantly, the salary for the energy manager position can be made budget neutral by paying for it after the first year through energy savings.

Alternatively, if the town is financially unable to hire a full-time energy manager, we recommend exploring regional opportunities such as a shared energy manager with a neighboring town, such as Bloomfield. In considering this option, the town must balance the initial reduction in salary requirements with the acknowledgement that shared staff may not be able to dedicate adequate resources to either town to achieve maximum energy savings.

- (2) The energy situation we find ourselves in is also rapidly changing. State and federal global warming limits will require us to reduce the carbon dioxide impact of our energy choices. State and regional electricity policy is moving towards real-time pricing where bills are not only based on the total amount of electricity consumed, but also the time at which it was used. An energy manager can help West Hartford prepare and prosper in these times of change.
- (3) Dedicate resources for expert consultants: Based on past experience, the town has benefitted from the services of outside professionals. We recommend the town continue to utilize these services, where appropriate, to facilitate further energy savings.
- (4) Join ICLEI (International Council for Local Environmental Initiatives) for training, technical assistance and other resources: For an annual membership fee of \$1200, ICLEI provides technical resources to assist towns in the formation and implementation of climate and energy plans as well as explicit guidance including how to design and develop a self-financing energy office.

B. Energy Financing

Policy Statement: *Implement energy efficiency upgrades and maximize the use of clean, renewable energy at the least cost to taxpayers by utilizing creative financing mechanisms.*

Current status and progress to date: West Hartford currently has an energy surplus fund with two intended purposes: (1) enable the town to weather short-term fluctuations in energy

prices; and (2) provide limited funding for efficiency projects, which in turn replenish the fund.

Actions:

- (1) Adopt the following funding hierarchy for energy efficiency and clean energy upgrades:

First: On-Bill Financing: We recommend that the town maximize the use of on-bill financing to fund efficiency upgrades.

With support from the CT Energy Efficiency Fund, the town can implement energy efficiency upgrades that save natural gas or electricity with no upfront capital cost. The town pays for the cost (at no interest) of the upgrade from the savings generated on the town's utility bills. After the utility provider recoups the cost, the town retains the future savings from the reduced energy use. This mechanism, however, is capped at \$20,000 per meter per year from the CT Energy Efficiency Fund.

Second: Capital Improvement Plan (bonding): We recommend that the town prioritize energy efficiency and renewable energy upgrades in the capital projects budget, as these projects will reduce operating costs and volatility of future town budgets. The town should create a separate capital project category for energy related investments in the Capital Improvement Plan and create an energy subgroup in each existing capital project category. Because West Hartford has a AAA bond rating, the town can pay for major upgrades at a lower total cost to taxpayers. Accordingly, the town can bond for measures that stabilize and reduce energy costs which can pay for debt service on the bonds and reduce pressure on the town budget. However, current uncertainty in the financial markets makes bonding more difficult and current budget problems may reduce the ability to pay for projects with longer-term savings.

Third: Town Operating Budget: We recommend that the town dedicate at least 50% of the energy surplus account and future conservation savings to a "clean energy trust" to support the implementation of the energy master plan and achieve additional energy savings to the town while also reducing the operating budget.

West Hartford can pay for energy improvements within its annual budget via the capital non-recurring expenses account. The town can exert downward pressure on the town budget by prioritizing energy efficiency projects. This mechanism is ideal for smaller projects since the total funds available likely are too limited for major improvements.

Fourth: Performance Contracting with third parties (Energy Service Companies or ESCOs): We recommend that the town hire performance contractors to make efficiency upgrades only when funding through other sources is not available.

The town can utilize outside companies to finance and implement efficiency upgrades and guarantee a fixed level of energy savings. West Hartford can pay

for the upgrades via the savings generated on the town's utility bills, less a commission for the third party. Similar to on-bill financing, there are no up-front costs with this mechanism. However, unlike on-bill financing, the town must share a portion of its energy savings with the third party. Additionally, the town must be aware of potential disputes over actual versus promised energy savings.

Grants as available: We recommend that the town prioritize grant research and writing for energy upgrades based on priorities in the town energy master plan.

The town can obtain grants to defray the cost of energy-related improvements from various outside sources including the federal and state government, the CT Energy Efficiency Fund, the CT Clean Energy Fund, Northeast Utilities, and other sources. While town employees work on grant writing as part of their overall responsibilities, West Hartford currently has no dedicated staff working on grants. With a new focus on efficiency and clean energy at the federal level there likely will be opportunities for the town if it has shovel-ready projects. By proactively detailing an energy strategy as described in this plan, West Hartford can have a competitive advantage over other entities seeking funds. It should be noted, however, that researching and applying for grants can be a time-consuming and uncertain process. In addition to town staff, we recommend the town seek the assistance of dedicated volunteers to assist in grant-writing.

(2) We recommend that West Hartford advocate for increased funding for municipal energy upgrades:

- Advocate for removal of funding limits for municipal projects supported by the CT Energy Efficiency Fund and partner with West Hartford's state legislators and other municipalities to advocate for this change.
- Advocate at the state level for continued and expanded funding for the CT Energy Efficiency Fund and CT Clean Energy Fund.
- Advocate at the federal level for support for clean energy infrastructure upgrades.

III. Energy: Vehicles, Transportation, Outdoor Engines

This section recommends strategies regarding reducing the amount of fuel consumed by all aspects of the town fleet. Energy use by the town includes the fuel used to power vehicles and outdoor equipment. The town owns approximately 300 vehicles of various types, i.e. sedans, light duty trucks, heavy duty trucks. The town also contracts with third parties for the use of other vehicles, i.e. school buses, garbage and recycling trucks.

A. Fuel Efficiency

***Policy Statement:** Increase fleet fuel efficiency to reduce costs, mitigate fuel price volatility, and reduce carbon emissions.*

Current status and progress to date:

In 2008, the town-operated vehicles consumed approximately 185,653 gallons of fuel (diesel and gasoline). On a monthly basis, the town fleet consumed an average of approximately 15,500 (515 gallons/day). The total cost of fuel in 2008 was approximately \$669,634. These figures are for the town-owned fleet, and do not include fuel used in vehicles owned/operated by the town's contractors. None of the town vehicles uses hybrid or alternative fuel sources. In 2008, carbon emissions totaled approximately 1,650 metric tons from town-owned vehicles.

Actions:

Target completion: 3 months

- (1) Establish baseline information on fuel consumption:** The town should assemble data for each unit of town government, for each of the prior three years, on: miles driven per vehicle; gallons of fuel purchased per vehicle; cost of fuel per vehicle; expected year of replacement or end of service per vehicle; estimated fuel efficiency per vehicle; heavy duty diesel vehicle make; engine year, and VIN. The data should be depicted in clear charts/spreadsheets for ease of comparing, within each department/unit. Much of the information is currently available from the town's monthly Wright Express Fuel Reports, though the details need to be assembled cumulatively per vehicle/per month, as well as per unit/department, to allow for strategic analysis.
- (2) Prepare fleet information for CT DOT Request for Proposal (RFP) for CT Clean Fuel Program and Diesel Emission Reduction Act:** The DOT program provides funding to municipalities to cover a portion of the purchase price for new alternative fuel or efficient (hybrid electric, compressed natural gas, propane, or electric) vehicles, or 100% of the price of diesel pollution control retrofits or auxiliary power units (APUs). The town should evaluate which vehicles need replacement over next two years, and submit applications in response to the RFP. The next RFP is

expected to be released in mid-March 2009, and will likely have a 30-day deadline to submit applications/proposals.

(3) Establish protocol to promote replacement of town vehicles, when scheduled/needed, with the highest fuel efficient vehicle in that class.

(4) Prepare heavy duty diesel vehicles inventory: This inventory will assist the town in applying for pollution control retrofits from the DOT Clean Fuel Program and grant funding from the Diesel Emission Reduction Act (DERA), which is a component of the 2009 stimulus package. Diesel fine particle pollution from town vehicle operation has potential negative health impacts on town workers and residents. Similar pollution control technologies to those in place on West Hartford diesel school buses can greatly reduce pollution from other types of diesel vehicles.

DERA was allocated \$300 million in the February 2009 federal stimulus, and a portion of those funds will be first-come first-serve for any entity to retrofit diesel vehicles with pollution controls. Applications are due to the US EPA no later than April 13, 2009.

(5) Identify other funding sources and options for fleet modernization.

Target completion: 1-2 years

- Develop a fuel efficiency goal for 2015 for the town's heavy duty vehicles.
- Develop protocol to promote purchase of equipment that minimizes fuel use or that uses cleaner low-carbon fuels.
- Reduce overall vehicle fuel use by 5% from 2008 baseline in 2009 and 2010.
- Reduce overall vehicle fuel use by 10% from 2008 baseline by 2011.

Target Completion: 5 years

Ensure that 20% of the town's light duty fleet (sedans) has a fuel efficiency of 40+ miles per gallon by 2015.

Ongoing Actions:

Continue to ensure proper maintenance of town vehicles: The town should use technologies such as synthetic lubricating oils and low-rolling resistance tires to increase fuel efficiency. The town should evaluate costs of synthetic oil versus savings from improved fuel efficiency and reduced maintenance.

B. Cleaner Fuel Options

***Policy Statement:** Reduce the carbon dioxide emissions from the town's fleet while increasing fuel efficiency and reducing fuel costs.*

Current status and progress to date:

The town uses commercially available fuels in all its vehicles. These fuel options currently do not include biodiesel blends, although the fuel does include ethanol blends for gasoline (which is a component of the gasoline sold at retail stations).

Ongoing Actions:

- (1) Evaluate the most effective options for reducing the carbon intensity of the town's vehicle fuel through strategies including electrification, advanced biofuels, and hydrogen.
 - **Electrification:** This refers to replacing traditional vehicle fuels with electricity stored on-board. The electric grid currently produces a lower carbon output than diesel or gasoline, and carbon dioxide from electricity generation is expected to decrease over time with the growth in renewable sources.
 - **Biodiesel:** This is a direct replacement for diesel fuel. It can be produced from domestic, renewable resources and blended at any level with petroleum diesel to create a biodiesel blend. Biodiesel blends are denoted as representing the percentage of biodiesel contained in the blend (i.e.: B20 is 20% biodiesel, 80% petroleum diesel). Biodiesel can be used in compression-ignition (diesel) engines with little or no modifications. The town should evaluate, with assistance from the WH CETF, whether to only promote biodiesel derived from waste vegetable oil, or also derived from food crops (which potentially can have significant negative side effects on food prices and land use patterns, which may outweigh any carbon emission benefits).
 - **Ethanol:** This is a direct replacement for gasoline. However, vehicles must be modified to be "flex fuel ready" to accept ethanol blends significantly greater than the 10% mix required by law. The town should evaluate, with assistance from the WH CETF, whether ethanol from available sources has global warming, air quality and economic benefits sufficient to warrant its increased use by the town.
 - **Hydrogen:** This is an energy carrier that can be produced using conventional or renewable sources. Hydrogen can be combusted directly, blended with other fuels, or provide energy in a fuel cell. The town should evaluate whether hydrogen from available sources has global warming, air quality and economic benefits sufficient to warrant its increased use by the town.

Target completion: 6-12 months

- (1) **Require the use of on-road grade ultra-low sulfur diesel fuel (max 15ppm sulfur) for all on and off-road town diesel vehicles as well as in contracts for third parties working on construction projects for the town:** The lower sulfur concentration (standard at commercial filling stations) reduces local air pollution and enables the installation of pollution controls.
- (2) **Evaluate use of biodiesel for town-owned and contracted vehicles:** The town should evaluate blends of B5, B10, B20, B50 and higher (number represents % of biodiesel in the fuel blend). In addition, the town should evaluate the potential location of biodiesel filling stations (including gauging the interest of local retail stations in supplying biodiesel), compatibility with town vehicles, environmental benefits, and cost estimates over next three years. If this evaluation is favorable, the

town should contact suppliers of biodiesel and options for supplying stations in or near West Hartford, as well as direct fueling to town fleet. Also, the town should contact CT DOT for background information on costs and suppliers.

- (3) Evaluate whether biodiesel or ethanol blends can be used in gasoline/diesel powered equipment (grass cutting, snow blowing, landscape equipment, etc):** The town should obtain pricing for delivery of biofuels to town facilities for storage (similar to current storage of equipment fuel) and use in equipment if the town finds there are environmental and/or economic benefits to available biofuels.
- (4) Identify types of vehicles and equipment with potential for electric alternatives and analyze cost-effectiveness for electrification of that equipment.**

C. Culture of Conservation

***Policy Statement:** Create a culture of conservation to reduce pollution and increase fuel efficiency.*

Current status and progress to date:

Town vehicles serve two primary purposes: (1) for equipment in performing tasks (police patrol cars, fire trucks, dump trucks, etc); and (2) for transportation. Also, the town currently has anti-idling policies, but these policies are not consistent across town departments. In addition, some schools post DEP anti-idling signs.

Actions:

Target Completion: 3 months

- (1) Adopt CT Department of Environmental Protection (DEP) 3 minute anti-idling requirement for all town departments (excluding the police department which is requested to minimize unnecessary idling).**
- (2) Post anti-idling signs provided by the CT DEP at all West Hartford schools and other appropriate buildings:** In addition, send out educational materials to town employees and contractors regarding this policy. Encourage building users to report excess idling.
- (3) Analyze vehicle use per unit/department to identify opportunities to improve/lower fuel use:** The evaluation should:
 - document baseline use;



- evaluate opportunities to perform essential tasks/services using less vehicles/fuel;
- evaluate uses of each vehicle used primarily for transportation to determine business necessity of such use;
- evaluate whether transportation vehicles could be shared (existing sharing increased) among users/uses, and eliminate less fuel efficient vehicles;
- evaluate which transportation needs can be addressed through alternatives to gasoline/diesel fueled vehicles, such as electric-powered vehicles, bicycles, walking; and
- evaluate opportunities for reducing vehicle miles for transportation such as carpooling to business meetings, pool cars so the most fuel efficient vehicle is used first, conference calls in lieu of driving to meetings, electronic mail exchange, closer meeting locations, “milk runs” (deliveries by one fuel-efficient vehicle making multiple stops instead of multiple vehicles making one delivery each; requires improved planning/transparency).

Target Completion: 1 year

(4) Hold competitions among town units to reduce fuel consumption.

(5) Transparency: Post (weekly or monthly) data on fuel usage in each unit that uses the fleet: This will allow employees to see their actual fuel use and compare to other users. The increased awareness may promote fuel efficient use and increase ideas/opportunities for efficiencies.

(6) Evaluate opportunities to improve landscaping efficiency: This will reduce fuel use associated with landscaping, including opportunities to reduce need/frequency of irrigation, mowing, mulching and other maintenance tasks. To this end, the town can design and implement pilot/demo projects to evaluate reduction in vehicle fuel use and adequacy of end landscape results.

(7) Evaluate sharing large vehicles with neighboring towns: For large vehicles that are only used on a non-urgent, scheduled basis (e.g., potentially some tree trimming vehicles, some dump trucks), evaluate opportunities to share new vehicle costs for high fuel efficiency vehicles and maintenance costs.

Ongoing Actions:

(8) Outdoor Equipment: Require that all landscape renovations, construction and maintenance, including contractors providing landscaping services, utilize sustainable landscape management techniques to lower use of gasoline/diesel powered equipment: For example, the town should select indigenous plants to reduce maintenance costs, including fuel and irrigation costs.



IV. Energy-Efficient Product Purchasing and Procurement



***Policy Statement:** Purchase products and institute consistent practices across all town departments that conserve energy and water, reduce greenhouse gas emissions and minimize the town's consumption of resources and costs over time and by doing so, be a leader in the state in creating a more energy efficient government and serve as a model to town residents.*

This section addresses how the town can save energy costs by requiring that the purchase of energy-using products, such as appliances, meet energy efficiency criteria. Studies conducted by the Lawrence Berkeley National Laboratory have shown that energy efficient products, which operate as effectively as conventional products, can reduce town facility energy costs by approximately 5% to 10%. Relative to conventional products, ENERGY STAR-qualified products typically use 25% to 50% less energy and can offer consumer energy cost savings of as much as 90%.

In addition to reducing energy costs, energy-efficient product procurement can lower maintenance costs (as some energy-efficient products require less-frequent replacement), reduce greenhouse gas emissions, and enhance pollution prevention and resource conservation activities.

Energy-efficient products can also reduce energy costs indirectly, since they do not generate as much unwanted heat as conventional products, thus lowering cooling energy loads. Because energy-efficient product procurement helps reduce energy loads, it can also increase the cost-effectiveness of other energy efficiency activities, such as facility upgrades.¹

This section provides strategies that the town can implement to achieve these benefits.

Current status and progress to date:

The town increasingly looks to the energy efficiency of potential purchases. West Hartford has phased out the use of water bubblers in town buildings and in 2009 purchased a highly efficient chiller to cool town hall rather than a less efficient model with a lower initial cost.

Ongoing Actions

- (1) Standardize purchases and procurement:** The town should create guidelines for departments to encourage standardization in purchases to reduce staff training needed to operate the equipment and increase the likelihood that equipment will be used correctly. Building energy management systems should be prioritized for standardization.
- (2) Purchase energy saving appliances:** Town departments should contact town facilities staff before purchasing any significant appliances using more than \$15 of

electricity per month for assistance choosing an efficient model. Departments failing to report major inefficient appliances may be held responsible for all energy costs through their own budgets.

- (3) Give preference to electricity from clean, renewable sources:** We recommend that when the town purchases energy, it give preference to options that maximize the use of new clean, renewable energy sources. West Hartford has committed to 20% renewable energy by 2010 to foster these nascent industries, which will, over time, increase savings potential for the town and other municipalities.
- (4) Lease or purchase only the most fuel-efficient models available that are suitable for the task:** In addition, the town can reduce the number of vehicles required to be purchased through car-sharing and car-pooling.
- (5) Require that new and replacement equipment for lighting, heating, ventilation, refrigeration and air conditioning systems, water consuming fixtures and process equipment and all such components shall meet or exceed Federal Energy Management Program (FEMP) recommended levels, whenever practical:** For example, recommend that all future purchases achieve U.S. EPA Energy Star standards.
- (6) Give preference to third party contractors who use California Air Resources Board or EPA certified diesel emissions controls on their on and off road equipment.**

V. Conclusion

As the enacting resolution of this energy plan sets forth, West Hartford has committed itself to increasing its use of clean, renewable energy, reducing its contribution to greenhouse gases and reducing its consumption of energy. In addition, recent history has made clear that municipalities must insulate themselves from global fluctuations in the price of energy. Coupled with an uncertain global economy, municipalities such as West Hartford must engage in a recalibration of how we purchase and use energy. In order to achieve these goals and protect our economic prosperity, this plan recommends that the West Hartford town council enact the foregoing recommendations.

This energy plan has set forth a variety of strategies regarding energy use with respect to the town's buildings and lighting; clean energy generation; energy planning, implementation and financing; vehicle fuel consumption; and purchasing and procurement. It is our sincere hope that by implementing these strategies, West Hartford will achieve the goals it has committed itself to, while at the same time reducing the overall operating costs of the town. If successful, West Hartford will continue to be a state leader in this new movement and serve as a role model for other municipalities, businesses, institutions, and residents.

Recommended Future Actions:

- (1) **Revise this energy plan annually and make it a living document:** We recommend that the town manager, together with the Town Council, set an update schedule for this plan, making yearly revisions, and require quarterly reporting from each department to assess progress in achieving the objectives of this plan.
- (2) **By March 1, 2010 the Town Manager and the Clean Energy Task Force should, together with key stakeholders in the community, develop a comprehensive clean energy plan for to further the adoption of clean energy and energy efficiency by West Hartford residents, businesses and institutions.**
- (3)



Consider broader sustainability or greenhouse gas plans: There are additional areas in which the town could save money and improve environmental quality, including landscaping, water use, and recycling, but these areas largely fell outside the scope of this plan. West Hartford has committed to the US Mayors Climate Protection Agreement which calls for the creation of a town-wide greenhouse gas inventory and climate plan, and we recommend West Hartford follow through with this commitment.

Appendix 1. Municipal Energy Manager

A municipal Energy Manager has been essential in enabling other towns and cities to monitor their energy usage and accomplish their energy goals. Below are but a few examples:

Carbondale, Colorado

According to Josh Smith, Carbondale, Colorado's Municipal Energy Manager, the job includes tasks such as; manage the implementation of a plans much like a project manager; supervise the start of projects which help the town reach their goals; keep projects on track, determine what needs to be done on specific projects; and interact with the town council to make recommendations on projects and making reports. A municipal energy manager may also following up with contractors; organize groups/organizations in the area with similar focuses; get people together to accomplish goals; coordinate with the community and the town government; and track town energy usage through soft ware. Overall, there are two layers to a municipal Energy manger. The internal layer is the goals of the municipality and the external layer is the education and organization of the community and public.² (Smith, Josh. Personal interview Rachel Hurvitz, 02/19/09).

Stamford, Connecticut

One local example of a successful municipal Energy Manager is Stamford, Connecticut. Mayor Dan Malloy has set an example of an energy efficient municipal environment that has made a commitment to reduce greenhouse gases, energy expenditures and improve city wide lighting efficiency. In 1998 the City of Stamford established a position responsible for energy, fuel efficiency and emissions reductions.

Stamford's success is due in large part to its municipal Energy Manager whose systematic approach to reducing energy waste has helped Stamford earn such honors as:

- Achievement of U.S. Green Building Council LEED Silver Standard (Leadership in Energy and Environmental Design) for all buildings over 5,000 square feet in 2007.
- In August 2002, the Stamford Public Schools worked with the Engineering Bureau to implement energy conservation measures throughout the public schools. In total, 23 energy conservation measures were implemented within the 20 schools in the district. The most significant measures were the installation of a centralized energy management system and lighting improvements with occupancy sensor controls.
- Nominated by the CT Energy Efficiency Fund (CEEF) and recognized by CL&P based upon its commitment to achieving energy saving through cost effective investments; addressing comprehensive changed in major energy systems, improving energy performance through operational practices and management level support; and demonstrating leadership to advance energy efficiency.³

Energy Projects completed by Stamford have resulted in annual electric savings of 7 million kilowatt hours and more than \$1.1 million dollars a year and the reduction of greenhouse gas emissions from city operations of close to 6,000 tons a year."⁴

Portland, Oregon

“When Portland surveyed its energy usage, it found more than 830 electricity, natural gas, and transportation fuel accounts in its eight bureaus (General Services, Parks, Water Works, Fire, Police, Maintenance, Environmental Services, and Traffic Management), with a total energy bill approaching \$9 million. Portland set a goal to save 20 percent of the city's energy bill - approximately \$1 million annually by July 1996.

To meet its goals, Portland launched the City Energy Challenge (CEC) program in July 1991. The program was designed to overcome obstacles to investment in energy efficiency and to develop an energy-saving incentive program to encourage efficiency in City government by returning a portion of the money saved to the participating bureaus.

Successful implementation of the program, however, proved challenging. Obtaining the funding needed to staff the program was the first and most critical obstacle. **While selling the concept of a coordinated push for energy savings was easy, convincing City Council to approve a new position at a time when police and fire services faced budget cuts was difficult.** Rather than draw from the city's general fund, the CEC employed an innovative mechanism to fund its energy management activities.

It gained approval to assess each of the city's bureaus a fee for CEC services equal to one percent of its energy expenditures (subject to a cap of \$15,000 per bureau). The bureaus gladly support the cost of the program for two reasons. First, as paying customers of the CEC, they are direct beneficiaries of the program's services. Second, they stand to gain not only service but actual revenue from their contributions to the conservation effort: some of the energy savings reaped as a result of CEC activities return directly to bureau budgets, rather than to the city's general fund.

Specific services offered under the CEC program include:

- *Annual Energy Reports*, which prioritize city facilities for energy audits, helping bureaus focus attention on areas of greatest need.
- *Energy audits*, which identify strategies and technologies that can achieve energy savings and estimate the magnitude of those savings.
- *Technical assistance*, which helps bureaus choose products, prepare bid documents, select contractors, apply for utility rebates and identify funding sources for energy-saving capital improvements.
- *Energy and environmental training*, which helps bureaus raise energy consciousness and get the most from their energy efficiency investments.
- The *CEC Newsletter*, which recognizes bureaus for energy efficiency, provides updates on CEC projects, and informs city employees of technologies and training opportunities.
- The CEC clearly provides crucial services, but it would be a vain effort without capital to fund actual efficiency upgrades. To combat this problem, the CEC enlisted the help of the **Portland Office of Fiscal Administration (OFA), which combined the financing of 46 individual upgrades and 'piggy-backed' the funding on a larger debt-sale to finance construction of a new police facility. This strategy gave each project access to a five-year, 3.86 percent loan.**

Because savings achieved are returned to bureaus to spend at their own discretion, they have a strong incentive to initiate energy-efficient projects quickly. Different bureaus have used the savings in a variety of ways. Those bureaus that assess charges for their services use the savings to reduce upward pressure on rates. Bureaus that have no debt and do not charge direct fees use the savings for new staff, improved benefits, computer equipment, or additional capital improvements.

The results of Portland's City Energy Challenge are impressive. In four and a half years, the CEC has identified potential annual savings of over \$1.2 million in over 70 facilities. Projects the program has implemented to date already save taxpayers over \$700,000 per year. These investments in energy and resource efficiency have cost the city \$2.6 million in capital but yield an internal rate of return averaging 25.7 percent and recapture their costs in under four years.”⁵

Hartford, Connecticut

This is a local example of an Energy Manager Job Description:

General Purpose

Under the general direction is responsible for the City's energy management plan including the use, procurement, conservation, and management of energy for the City and the Board of Education. Manages the HVAC control and energy tracking computer system for the City and the Board of Education.

Distinguishing Characteristics

This position is in the unclassified service and incumbent is appointed and serves at the pleasure of the Mayor in accordance with Chapters IV and V of the City Charter.

Essential Duties and Responsibilities

- Ensures that energy management operations are supportive of the goals of the City and the Board of Education.
- Develops short and long-range plans for the implementation of energy management and innovations.
- Pursues an aggressive program to reduce the total cost of energy for the City and Board of Education.
- Works with maintenance managers in developing energy standards to ensure energy efficiencies and effectiveness and develops training plans to the best operation of all energy equipment and systems.
- Evaluates and implements new energy conservation technologies and management strategies and recommends sound energy conservation policies.
- -Researches and secures energy efficiency grants and rebates for projects.
- Monitors all facilities design and construction activities as they relate to energy management and manages energy- related construction projects including the work of contractors.
- Manages all energy reports, invoices, and associated documents.
- Complies utility budgets and energy conservation measure cost estimates for all existing and proposed programs.

- Maintains liaison with equipment suppliers in order to keep abreast of new products and equipment and reviews and recommends maintenance supply and equipment purchases to ensure energy efficient replacements are being specified, while establishing a standard specification for all energy associated items.
- Provides expert professional assistance and guidance on energy management and conservation.
- Represents the City in high-level meetings regarding energy management.

The above essential duties and responsibilities are not intended as a comprehensive list; they are intended to provide a representative summary of the major duties and responsibilities. Incumbent(s) may be required to perform additional related duties.

Knowledge, Skill and Ability

Knowledge of

- Principles and practices of engineering as they apply to energy management.
- Energy management program analysis and development.
- Federal and state funding sources and applicable laws and regulations relating to energy management.
- Large heating, ventilation, and air conditioning systems, controls.
- Operations of large-scale automation systems.
- Microprocessor technology and programming.

Ability to

- Develop and manage an energy budget; manage personnel and outside contractors.
- Interface with public utility representatives.
- Establish and maintain highly effective working relationships with contractors, utility representative, school officials, other City managers, service providers, and the public.
- Prepare clear, concise and comprehensive reports, studies and other written materials.

Minimum Qualifications

Bachelor's degree in mechanical or electrical engineering, engineering technology or a closely related field from an accredited college or university and three years of increasingly responsible professional and managerial experience in energy management or energy analysis.

Licenses; Certifications; Special Requirements

Must possess and maintain a valid driver's license. Certification with a professional designation of Certified Energy Manager (CEM) is preferred.

Physical Demands and Working Conditions

Work is performed primarily in an office environment with some travel to different sites; may be exposed to conditions in mechanical/boiler rooms, roofs and construction sites.

Incumbents may be required to work extended hours including evenings and weekends.

Other Training Opportunities

The following are examples from non-municipalities and opportunities for training:

University Energy Managers

- The five-college consortium in Northampton, Massachusetts share an energy manager and pays the salary from conservation savings;
- Dartmouth College has identified \$7 – 10 M in conservation opportunities and has created an energy manager position to focus on implementation of this savings plan.

Training for Energy Managers through ICLEI (International Council for Local Environmental Initiatives)

- Through a variety of training offerings, there will be availability to train ICLEI members (and other local governments, on a fee basis) on how to design and develop a self-financing energy office and complementary energy programs within your local government.
- These trainings will provide valuable information on how to begin a local energy office and prepare plans for spending the federal energy conservation funding from the economic stimulus bill.
- This information will include startup information for energy conservation programs and important information on approved performance metrics required to track the use and success of the federal stimulus dollars.

Appendix 2: Green Buildings

What is a “green” building?

Green building techniques result in a more efficient building, decreasing the impact of our built environment. Examples of such techniques include installing high-efficiency appliances and heating/cooling systems, incorporating renewable energy systems such as solar hot water and solar electric panels, installing a green roof to control precipitation runoff, collecting grey water (water from sinks and showers) for reuse in toilets or outdoor gardens, and incorporating passive solar design features to use the sun to provide natural light and heating. These design measures reduce the amount of energy and water a building must consume to meet its needs, as well as the amount of waste it generates. Such environmental benefits also reap monetary rewards; green architecture techniques significantly lower the operating costs of a building.

What are LEED Green Building Standards?

The Leadership in Energy and Environmental Design (LEED) Green Building Rating System is a widely accepted green building rating system created by the U.S. Green Building Council. Their website describes LEED as “a voluntary, consensus-based national rating system for developing high-performance, sustainable buildings.

The LEED Standards serve as the national benchmark for green design, construction, and operation nationwide. Adherence to LEED guidelines will qualify a building as certified, silver, gold, or platinum, depending on the degree to which green standards are implemented. The platinum rating is the highest of the four levels.

LEED consists of 69 possible rating points divided into the following areas:

- Sustainable Siting (14 Possible Points) - Site Selection, Alternative Transportation, Reduced Site Disturbance, Storm Water Management, Reduction of Heat Islands, Reduction of Light Pollution
- Water Efficiency (5 Points Possible) - Water Efficient Landscaping, Innovative Wastewater Technologies, Water Use Reduction
- Materials and Resources (13 Possible Pts.) - Building Reuse, Construction Waste Management, Resource Reuse, Recycled Content, Local/Regional Materials, Rapidly Renewable Materials, Certified Wood
- Energy and Atmosphere (17 Possible Pts.) - *Optimize Energy Performance*, Renewable Energy, Commissioning, Measurement & Verification, Ozone Depletion
- Indoor Environmental Quality (15 Pts.) - CO2 Monitoring, Increase Ventilation Effectiveness, Construction indoor air quality Management Plan, Low-Emitting Materials, Indoor Chemical & Pollutant Source Control, Controllability of Systems, Thermal Comfort, Daylight & Views

- Innovation and Design Process (5 Pts.) - Innovation In Design Credits, LEED Accredited Professional
- The lowest level is LEED Certified (26 - 32 points) followed by Silver (33 – 38 points), Gold (39 – 51 points), and Platinum (52 – 69 points).

Why is Indoor Environmental Quality Important?

- Typical staff salary cost: \$100 to \$200/sf/yr.
- Typical energy cost: \$1.50 to \$6.00/sf/yr.
- Even modest productivity gains can produce substantial savings.
- Building to LEED standards helps to focus the design team on key indoor environmental improvements such as:
 - Ventilation/Air Quality
 - Lighting/Daylighting
 - Temperature/Humidity Control

How are Connecticut towns using these standards in their buildings?

Building construction and renovation receiving significant state funds (schools) is required to be LEED Silver and 20% more efficient than the standard building code, per state law.

Studies on Costs

The US Green Building Council maintains a database of green building economic analyses here: http://www.usgbc.org/DisplayPage.aspx?CMSPageID=77#economic_analysis

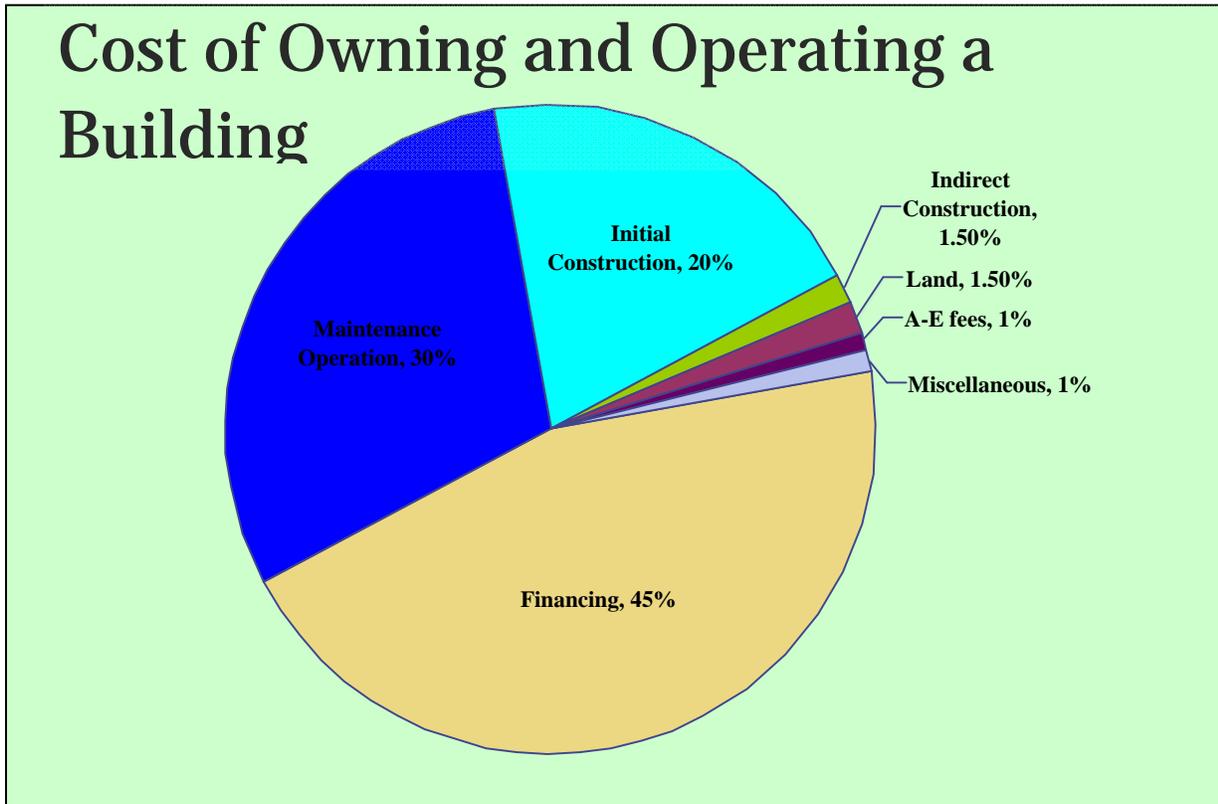
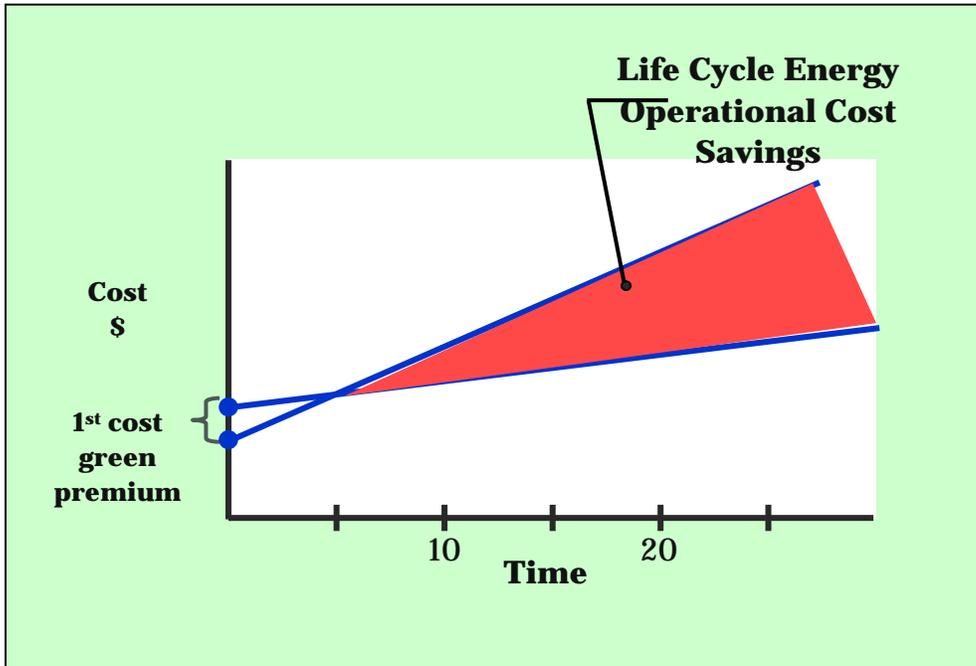
The Costs and Financial Benefits of Green Buildings Study

This study, though prepared for California's Sustainable Building Task Force, contains helpful information about initial and long-term costs. According the Executive Summary, for instance, a 2% upfront increase in construction costs will ultimately reap a life-cycle savings 10 times the initial investment.⁶

CT Office of Fiscal Analysis Fiscal Note For Amendment LCO # 8665 of Public Act 07-242, An Act Concerning Electricity and Energy Efficiency⁷

- The Office of Fiscal Analysis (OFA) of the Connecticut General Assembly's fiscal analysis of Section 11 acknowledges that any "additional construction costs [of LEED Silver construction] could be offset by savings in the operations of the new buildings over their lifetime, especially in heating and ventilation costs. These savings are estimated by industry sources to be up to 30% of annual utility costs." The OFA therefore determined that there is no additional cost incurred through LEED construction, as long-term savings compensate for minimal initial elevated costs and initial costs are minimized by building to LEED standards from the outset.
- This state-level analysis for state-funded buildings (including schools) can be applied to similar municipal construction.
- High Performance Schools Initiative – Connecticut Green Building Council⁸

- Pages 13-14 of this publication provide relevant cost information to debunk the common misperception that green building is more costly than conventional building. These pages highlight both the negligible upfront cost increase and the rapid payback of said increases over a building's life span. Although the report is specific to school buildings, the information is broadly applicable to other municipal construction and can be presented to town officials.
- “Over the span of their use, high performance [green] schools are significantly less expensive to build and operate than conventionally built schools. These schools offer taxpayers better value for their tax dollars and provide a better environment for student learning. While nationwide data suggest that the first costs of high-performance construction are between 0% and 2% more than conventional construction, high performance buildings typically use 30% less energy than code-built buildings so the utility savings alone result in cost payback in 3 to 5 years.”
- “...any additional first cost for HP [high performance] facilities would occur in the design phase, which typically requires the use of an integrated approach, simulation of alternatives, and building commissioning. With design typically accounting for only 10% of the total project cost, the additional requirements should raise the total project cost by no more than 2%.”
- [*Analyzing the Cost of Obtaining LEED Certification*](#) (A) brief report prepared by Northbridge Environmental Management Consultants of Westford, MA. ⁹
- US Green Building Council State and Local Government Toolkit¹⁰



Figures are for estimation purposes only

YALE UNIVERSITY GREENHOUSE GAS REDUCTION MEASURES

		Emissions Reduction (MTCO ₂ e)	Capital Cost	Simple Pay-back Period (yrs) ¹
Conservation:				
<u>INITIATIVES WITHIN PRE-2005 BUILDINGS</u>				
Rebalance & reduce air change in science buildings	} Measures to match energy supply more closely to energy need	2,000	\$300,000	1
Off hour set back to HVAC systems		2,000	\$0	n/a
Re-commissioning buildings		18,000	\$1,500,000	.6
Occupancy sensors tied to lighting		3,000	\$1,500,000	3.3
		25,000	3,300,000	0.9
High efficiency windows	} Measures to increase building envelope performance	5,000	\$3,000,000	4
High albedo roofing				
Increased insulation of building envelope				
Low energy lighting	} Measures to increase the efficiency of building systems	20,000	\$10,000,000	3.3
Heat recovery loops				
High efficiency loops				
Upgrading from steam to hot water heating				
High efficiency motors				
	Sub-Total	50,000	\$16,300,000	2.2
<u>INITIATIVES WITHIN POST 2005 BUILDINGS</u>				
Building orientation and massing	} Measures to reduce a building's energy demand	5,000	\$5,000,000	6.7
Daylight harvesting strategies				
Passive ventilation strategies				
Enthalpy wheels at science buildings	} Measures to reduce a building's energy consumption	10,000	\$10,000,000	6.7
Chilled beams				
Displacement air systems				
	Sub-Total	15,000	\$15,000,000	6.7
<u>INITIATIVES WITHIN POWER PLANTS & DISTRIBUTION SYSTEM</u>				
Cogeneration	} Measures to increase efficacy of energy production systems	20,000	\$70,000,000	7
Free-cooling via plate and frame heat exchangers		2,500	\$1,000,000	2.7
Micro-turbines within steam distribution system		2,500	\$4,000,000	10.7
	Sub-Total	25,000	\$75,000,000	7
Renewable Energy:				
<u>ON CAMPUS INSTALLATIONS</u>				
Solar photovoltaic: 500kW	} Measures to eliminate or reduce emissions compared to conventional fossil base energy systems	250	\$3,200,000	15
Solar thermal: 10 large installations		4,000	\$10,000,000	6
Micro-wind turbines: 5 bundles		50	\$500,000	15
Geothermal: 40 standing columns		1,500	\$8,000,000	10
Fuel cells: 5 units		4,250	\$7,000,000	11
	Sub-Total	10,050	\$28,700,000	9
<u>OFF CAMPUS INSTALLATIONS</u>				
Wind based power purchase agreements ²	} Measures to eliminate or reduce emissions compared to conventional fossil base energy systems	50,000	\$6,250,000	n/a
Solar photovoltaic based power purchase agreements ²		10,000	\$1,250,000	n/a
	Sub-Total	60,000	see footnote 2	n/a
	TOTAL	160,050	\$135,000,000	

¹ Payback values assume \$13/MCF fuel cost

² Wind + Solar combined purchase of 150,000Mwh @ \$.10 per kWh premium totaling \$7.5M to \$15M non-capital expense.



3. EPA Community Energy Challenge

West Hartford has endorsed the EPA Community Energy Challenge which requires the town to conduct EnergyStar portfolio manager benchmarking on its buildings and reduce energy use 10% from an established baseline. As a bonus, the EPA/Department of Energy EnergyStar program recognizes buildings ranked in the top 25 percent nationwide in energy efficiency as “Energy Star” buildings and provides them with a plaque to recognize their achievement. Typically, these buildings use 35 percent less energy than the average comparable structure. (Comparative data is from the Department of Energy’s Commercial Buildings Energy Consumption Survey, a national survey of building features, energy consumption, and commercial building expenditures.)

See also the EnergyStar Portfolio Manager, at <https://www.energystar.gov/istar/pmpam/>

- 1 EPA, Local Best Practices, Energy Efficient Purchasing, at http://www.epa.gov/cleanenergy/documents/webcasts/section_6_6_procurement_2-22.pdf
- 2 Smith, Josh. Personal interview Rachel Hurvitz, 02/19/09.
- 3 <http://www.icleiusa.org/success-stories/cool-mayors/daniel-malloy-mayor-of-city-of-stamford/>
- 4 <http://www.ctclimatechange.com/documents/StamfordTakesAction.pdf>
- 5 <http://www.smartcommunities.ncat.org/success/portland.shtml>
- 6 <http://www.scsa.ca.gov/documents/publications/costs-financials.pdf>
- 7 <http://www.cga.ct.gov/2007/fna/2007HB-07432-ROOLCO08665-FNA.htm>
- 8 http://www.ctgbc.org/hps/docs/hpschools_finalreport_2006.pdf
- 9 http://www.cleanair-coolplanet.org/for_communities/LEED_links/AnalyzingtheCostofLEED.pdf
- 10 http://www.cleanair-coolplanet.org/for_communities/LEED_links/GreenBuildingToolkit.pdf